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ABSTRACT

A study was conducted to identify the capacities of young children to demonstrate differential communicative responsiveness to normal children (same age and older) and to older, retarded children of an equal mental age in the context of a collaborative problem solving task. Eleven normally developing children (aged six to eight years) were the target subjects. Three were observed interacting with same-age, same-sex, normally developing children; four were observed interacting with older, same-sex, normally developing children; and four were observed interacting with older, same-sex, retarded children who were functioning at approximately the same developmental level as the normal children. The children worked in dyads. In the same-age dyads, communication was symmetrical: both partners produced similar numbers of total utterances, action directives, responses, and judgments of the task. In the mixed-age dyads, conversational dominance fluctuated between the older and younger child in different dyads. In the normal/retarded dyads, the normal children dominated conversation, creating an assymmetrical communication pattern. (Author/FL)

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Children's Communication Strategies in a Cooperative Learning Task with Developmentally Delayed and Normal Partners

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SUMMARY

This study identified the capacities of young children to demonstrate differential communicative responsiveness to normal peers (same age and older) and to older retarded children of an equal mental age in the context of a collaborative problem solving task. Communication in the same-age dyads was symmetrical. Both partners produced similar numbers of 1) total utterances, 2) action directives, 3) responses, and 4) judgments of the task. In the mixed-age dyads, conversational dominance fluctuated between the older and younger child in different dyads. In the normal-retarded dyads, the normals dominated conversation, making an assymetrical communication pattern.

Children's Communication Strategies in a Cooperative Learning Task with Developmentally Delayed and Normal Partners

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Previous research has demonstrated that young children can use a variety of communicative devices to respond to the needs of their listeners. For example, the younger their conversational partner, the more young children will tend to produce short, simple utterances and use attention getting and sustaining devices (Shatz & Gelman, 1973). The extent of this listener-adaptation capacity has been explored by looking at the communicative strategies of young children in talking to listeners with a variety of special needs. Most of these studies have observed children interacting with partners having handicaps contrived by devices such as screens or blindfolds (Glucksburg & Krauss, 1967; Maratsos, 1973). More recently, a study of children interacting with naturally handicapped children of their same chronological age (Guralnick & Paul-Brown, 1977) revealed that young children can differentially adjust to the general developmental level of their conversational partner. To date, no research has considered the communicative strategies of young children with handicapped partners of their same general developmental level, but who are chro-

nologically older, and how these strategies compare with children's communication with their normally developing peers.

An examination of the ability of young children to accomodate to an older but developmentally equivalent partner is not only of interest from the perspective of furthering our understanding of the young child's developing communication skills, it also has direct implications for the field of education. Special educators have recently begun advocating (and legislatures have begun mandating) the practice of mainstreaming, i.e., placing handicapped children in educational settings with normal children of similar developmental levels. The underlying assumption that such a setting provides an optimal learning climate for both the handicapped and the normal child has yet to be clearly supported by empirical evidence. Of interest specifically are both (1) normal children's ability to facilitate the cognitive growth of handicapped children in a peer-assisted learning situation via appropriate communication behaviors, and (2) the opportunities for the growth of communicative skills that handicapped children provide for their normally developing peers.

The purpose of the present study was to identify the capacities of the young child (hereafter referred to as the target child) to demonstrate differential communicative responsiveness to normal peers of their same age and to older but developmentally similar peers. The communicative strategies with the chronologically older handicapped partners was also compared to the communicative strategies of the target child with older normally developing children. The study assessed differences in the children's communicative strategies in a collaborative problem solving task.

It was expected that the documented differences between normal and developmentally delayed children (i.e., retarded children) of the same developmental level would result in the delayed children providing different feedback to the target children which, in turn, would shape the different communicative strategies of the target children used with each type of listener. For example, compared to normal children of the same developmental level, retarded children have difficulty in developing principles and displaying foresight in logical problem solving (Denny, 1974; Spitz & Nadler, 1974; Spitz & Winters, 1977). In fact, differences in logical problem solving have "turned up some of the most dramatic differences between retarded and equal MA [mental age or developmental level] nonretarded people" (Spitz, 1976, p. 50). Retarded children are also considered less flexible in their reasoning abilities than normal children of the same developmental level. They tend to repeat one response strategy rather than trying new and different strategies (Gerjuoy & Winters, 1968). In the present study a logical problem solving task was used to maximize the target children's opportunities to observe differences between the types of children serving as partners.

METHOD

Subjects

Eleven normally developing children were the target subjects of this study. Three were observed interacting with same-age, same-sex, normally developing peers (being the same age, these

dyads were labelled S); four were observed interacting with older, same-sex, normally developing children (consisting of younger and older members, these dyads were labelled YO); and four were observed interacting with older, same-sex, retarded children who were functioning at approximately the same developmental level as the normals (consisting of normal and retarded members, these dyads were labelled NR). The children in each dyad were unacquainted prior to participation in the study. The exact ages of each child and the sex of each dyad are given in Table 1.

Table 1. Sex of each dyad and age of each member.

Dyad	Sex of Dyad	Age of Normal Target	Age of Other Child
NR1	female	6;7	9;0
NR2	female	8;2	10;1
NR3	male	9;0	10;6
NR4	male	7;2	9;2
S1	male	8;6	8;2
S2	female	8;2	8;2
S3	male	7;4	7;2
YO1	female	6;3	8;5
YO2	male	7;11	9;8
YO3	male	8;4	10;7
YO4	female	8;4	10;3

Task

The game involved using a pan balance scale to locate pairs of blocks of matching weight from two sets of hollow plastic blocks which varied in weight but not in size. The blocks contained small lead weights and simple line drawings affixed to each face. Each child was given a set of six blocks, with six different weights. All pictures were different. However, in each child's set of six blocks, the pictures on one block corresponded functionally to the pictures on one block of the other child's set. Only the block pairs depicting functional correspondences weighed the same. The functional analogies pictured on the blocks were a baseball and bat, toothbrush and toothpaste, mop and pail, shoe and sock, hammer and nail, and needle and thread. No effort was made to control which member of each corresponding pair of blocks was included in a particular set.

As the children placed a pair of blocks of matching weights on the pan of the scale, a rod attached to the center of the crossbar pointed to a happy face attached to the base of the scale. In this way, the children were capable of confirming a successful match by themselves, and even children who might not have understood the principle of balance scales could use this explicit criterion for a successful match.

Procedure

The observations were made in a quiet room in the children's public school, and were videotaped using SONY Portapak equipment. During the experimental session, the children were seated next to one another on the floor facing the scale. With four pairs of

solid-colored blocks, the experimenter demonstrated how some pairs of blocks made the rod "point to the happy face" and that these were to be placed in boxes adjacent to each child's scale pan; those that did not balance were to be placed back in the child's pile of blocks. After giving each child a set of six blocks, the experimenter encouraged the dyad to find all the blocks that made the rod point to the happy face. Any dyads who suggested they were finished before matching six sets of blocks were also encouraged to continue until all the blocks had been matched. The children were allowed to make as many attempts as they wished.

Scoring

The data were obtained from transcriptions of the videotapes. Both verbal and nonverbal behaviors were transcribed according to conventions set forth by Bloom, Hood, and Lightbown (Appendix A.1, Bloom & Lahey, 1978). The data were first coded for four dependent variables which were used to measure performance on the task: (a) the number of successfully matched pairs of blocks, six being the maximum; (b) the total number of pairs placed on the scales (the number of attempts); (c) the ratio of matched pairs to total attempts, which provided an indication of the efficiency of the dyad's efforts; and (d) the time utilized by the children in working on the task. For these measures, the unit of analysis was the dyad, not the individual children.

For each member of each dyad, five categories of communication were separately coded:

1) Total number of utterances produced by each member of the dyad and, related to this, the percentage of the total number of

utterances produced by the dyad that was produced by each member. This second measure indicated which member of the dyad dominated the conversation which accompanied the task.

2) Attention focusing statement--utterance that alerts or orients the partner to the task, such as "hey", "look", and the partner's name;

3) Action directives:

   a. imperatives;

   b. joint proposal, e.g., "Let's put this block on."

4) Response to directive or question:

   a. ignore--no response;

   b. informative/uninformative verbal response;

   c. accurate/inaccurate nonverbal response to directive, e.g., partner picks up block requested.

5) Judgments of matching:

   a. evaluative feedback (either praise or criticism of other child);

   b. descriptive, e.g., "yes", "no", "we got one", "this one's heavier", "it works", "it's pointing to the happy face".

6) Description of blocks (prior to placement on scale):

   a. accurate labels, e.g., "mop and pail"; "toothbrush";

   b. inaccurate label, e.g., "thimble";

   c. accurate attribute, e.g., "light"; "hollow";

   d. inaccurate attribute, e.g., "little"; "big";

   e. comparative, e.g., "heavier", "heaviest".

Interjudge point by point percentage agreement was 100% for the efficiency measure, 83% for action directives, 86% for block descriptions, 78% for responses, and 96% for judgments.

RESULTS

While the small amount of data was not sufficient to allow statistical comparisons, several consistent patterns did emerge which suggest different communication behaviors on the part of the normal target children as a function of dyad composition (partner of same age, older, and older retarded but of equivalent mental age). Interestingly, the results of the dyad performance did not reveal any consistent patterns. The performance measures will be discussed first.

Performance Measures

All eleven dyads were able to complete the balance scale task, providing no variance on the number of successful matched pairs measure. As such, two other measures, the total number of attempts and the ratio of matched pairs to total attempts, were exactly proportional and both provided an indication of the efficiency of the dyad unit. As such, only the efficiency ratio will be discussed. The average efficiency ratio for all three types of dyads were very similar, being .58 for the normal and retarded (NR) dyads, .51 for the same-aged (S) dyads, and .59 for the younger-older (YO) dyads. These ratios indicate approximately twice as many attempts as matches on the average. The variation in efficiency of dyads within each dyad type was greatest for the NR dyads

(SD = .36), least for the S dyads (SD = .13), and intermediate for the YO dyads (SD = .25). The time taken to complete the task was greatest, on the average, for the NR dyads ($\bar{x}$ = 4.87 minutes). In this group, the more efficient dyads were also those who completed the task the fastest. The S dyads were intermediate on the time measure ($\bar{x}$ = 3.92 minutes); the YO dyads completed the task most rapidly ($\bar{x}$ = 3.47 minutes). For both the S and YO groups, there was no systematic relationship between time to complete the task and efficiency.

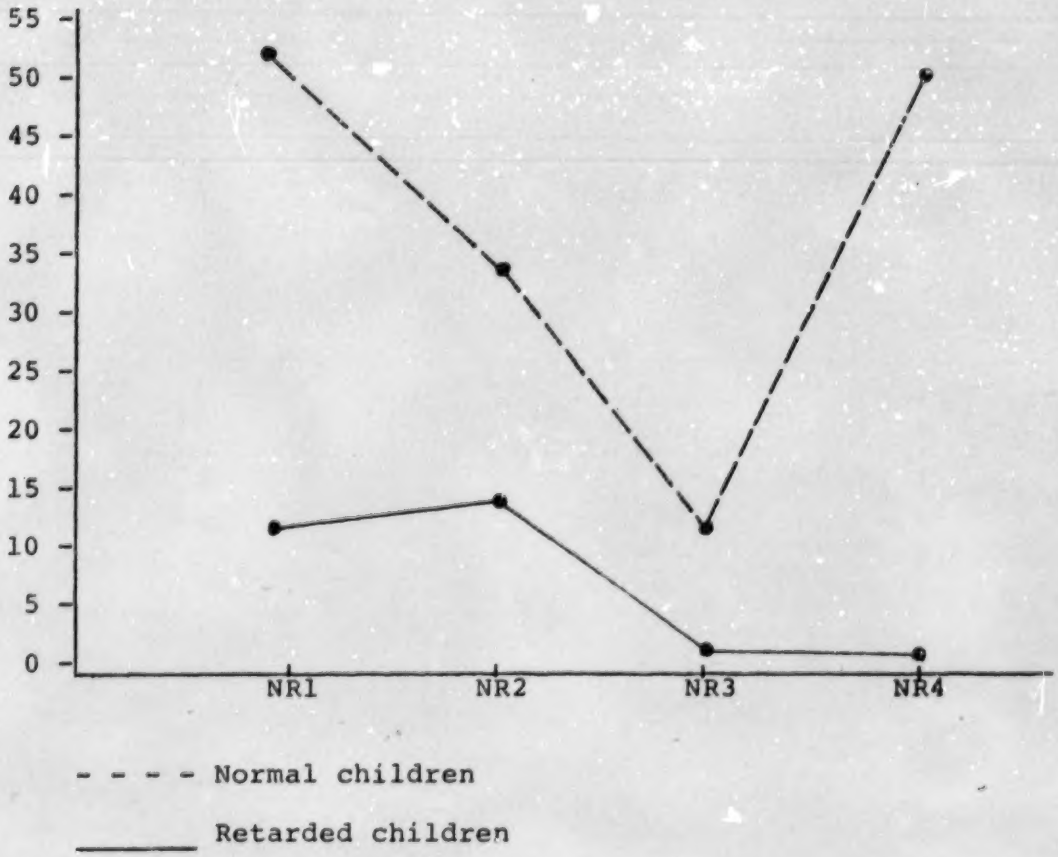
Communication Measures

For the 11 dyads observed, two categories and one subcategory of communication behavior did not yield sufficient data to warrant any conclusions. These were attention focusing statements (found in only one dyad), block descriptions (found in only six of the dyads), and the subcategory of judgments labelled evaluative feedback (only one instance in one dyad).

For three other communication measures, consistently different patterns emerged as a function of dyad type. These were number of utterances, action directives, and responses. For one measure, judgments, a similar consistent pattern of occurrence emerged across all three dyads. The patterns observed for each of these measures in each dyad type are presented below.

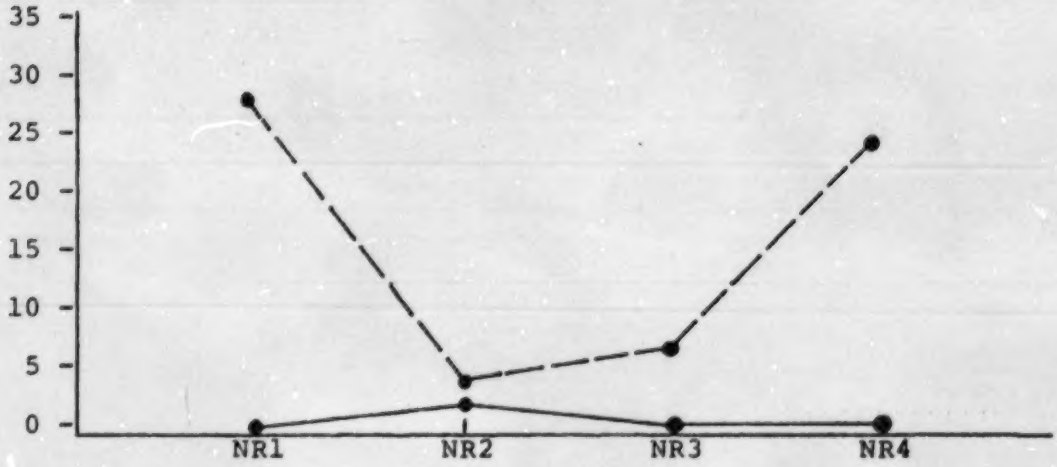
In the NR dyads, the communication exchange was characterized by assymetry, with the normal member of the dyad dominating the dialogue. As shown in Figure 1, the normal children did the vast majority of talking in all four dyads. Breaking down the total amount of speech, the types of communication behaviors the normal children produced in the interaction can be observed.

Figure 1. The number of utterances produced by the normal children and the retarded children in each of the four dyads.



In Figure 2, it can be seen that the normals produced nearly all the action directives. Following from the finding that the normal children produced most of the action directives, the results shown in Figure 3 regarding response patterns are not surprising. The retarded members of the dyads supplied the majority of

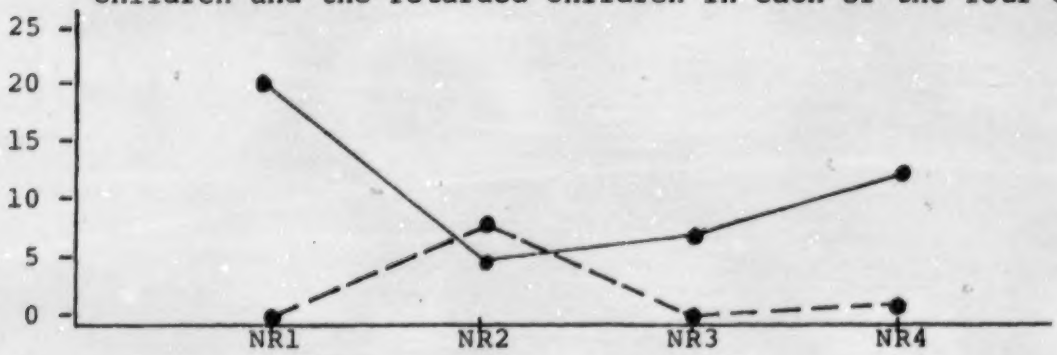
Figure 2. The number of action directives produced by the normal children and the retarded children in each of the four dyads.



- - - - Normal children

_____ Retarded children

Figure 3. The number of responses produced by the normal children and the retarded children in each of the four dyads.



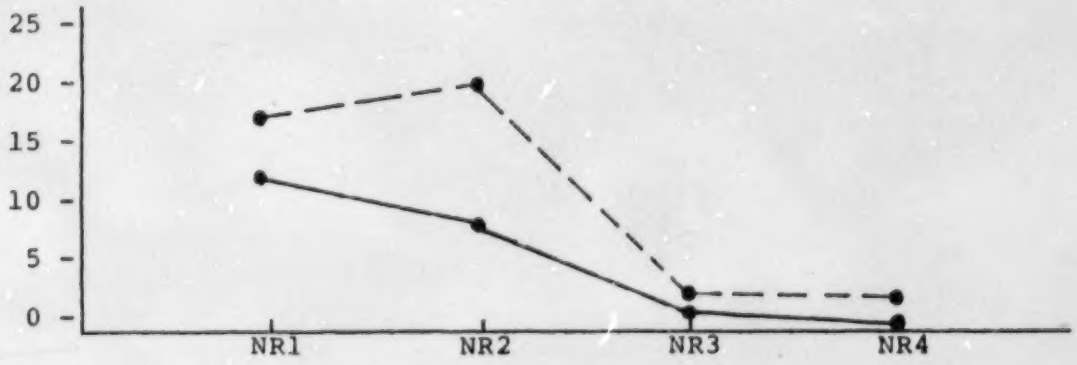
- - - - Normal children

_____ Retarded children

responses, and these were c[illegible]whelmingly nonverbal in nature. The normal children also [illegible]ed the majority of judgments concerning the success or failure of each block-matching attempt.

These results appear in Figure 4. While the normals produced the greater absolute number of judgments in all four dyads, a symmetry between dyad members in the occurrence of judgments was also observed. A greater number of judgments by the normal member co-occurred with a proportionally greater number of judgments by the retarded dyad member.

Figure 4. The number of judgments produced by the normal children and the retarded children in each of the four dyads.

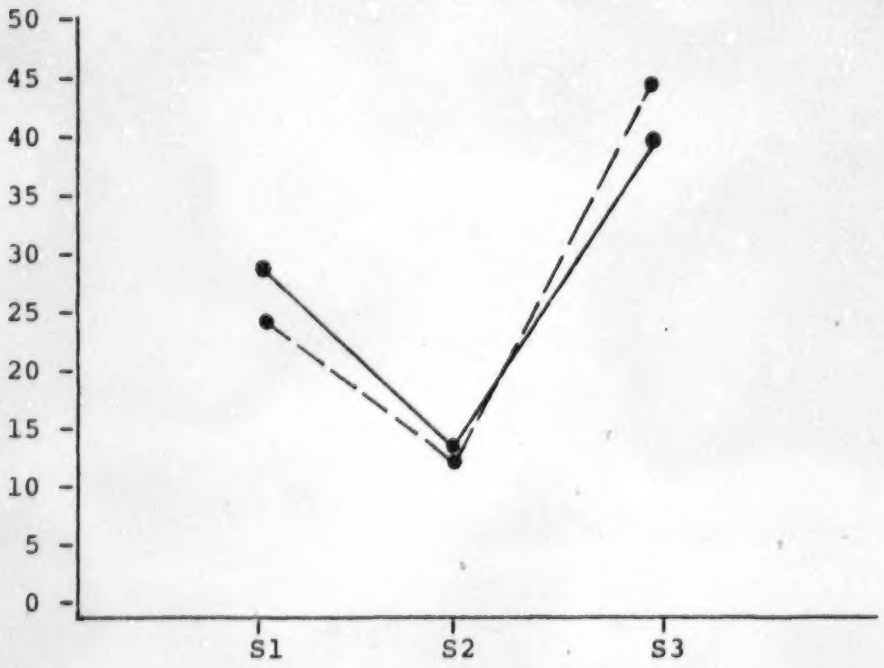


- - - - Normal children

_____ Retarded children

In the S (same-aged normals) dyads, there was much greater symmetry in the dialogue accompanying the task. The amount of talking by both partners was similar in all three dyads (see Figure 5). Also, there were similar numbers of action directives (Figure 6), responses (Figure 7), and judgments (Figure 8) by each member of the dyad.

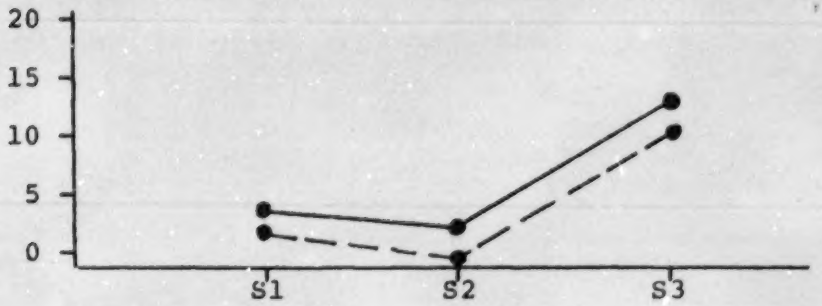
Figure 5. Total number of utterances produced by the target normal children and their same-aged normal partners in each of the three dyads.



- - - - Target normal children

_____ Same-aged normal partners

Figure 6. The number of action directives produced by the target normal children and their same-aged normal partners in each of the three dyads.



- - - - Target normal children

_____ Same-aged normal partners

Figure 7. The number of responses produced by the target normal children and their same-aged normal partners in each of the three dyads.

- - - - Target normal children

_____ Same-aged partners

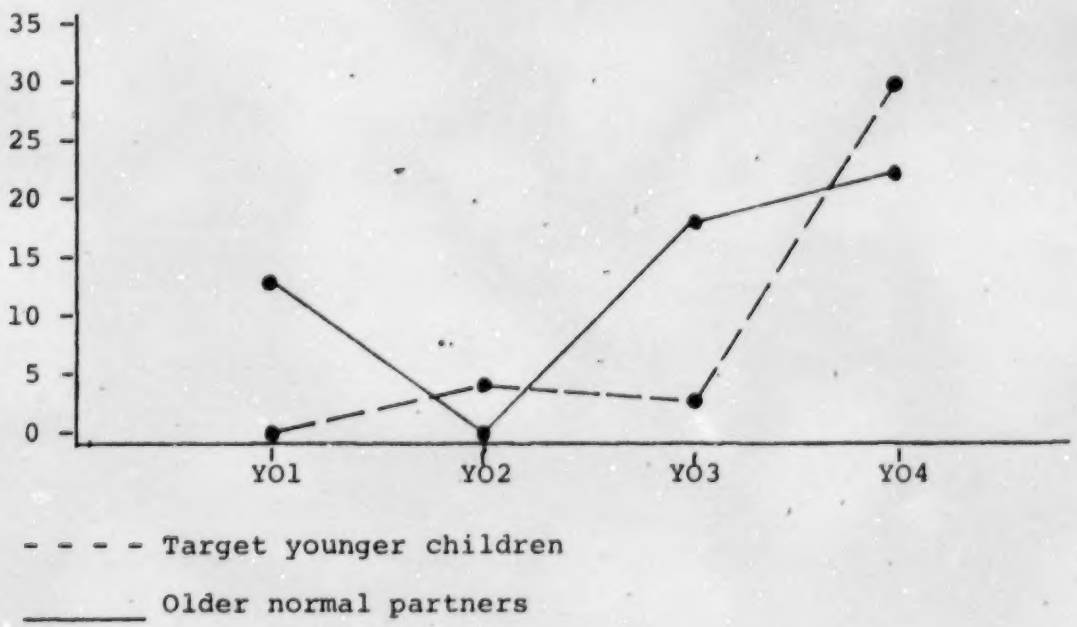
Figure 8. The number of judgments produced by the target normal children and their same-aged normal partners in each of the three dyads.

- - - - Target normal children

_____ Same-aged partners

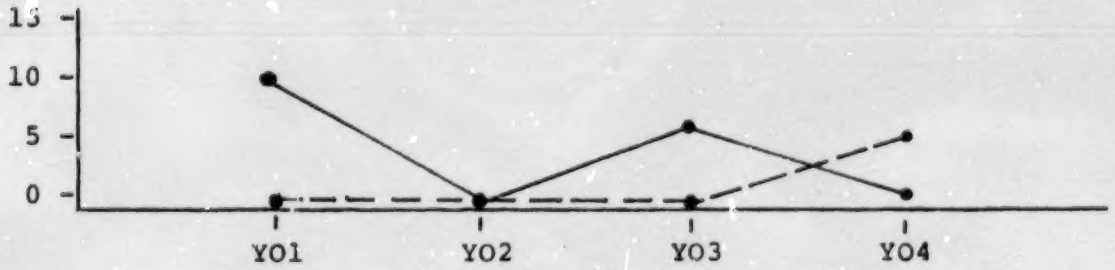
In the YO (younger/older normal) dyads, there was in general less talking. There were fewer total utterances (summed for both dyad members) for the YO dyads ($\bar{x}$ = 23) than for either the NR ($\bar{x}$ = 44) or the S ($\bar{x}$ = 54) dyad types. Following from this, the normal target children were least talkative in this condition, with an average of 10 utterances per dyadic interaction as opposed to an average of 37 with retarded partners and 27 with normal same-aged partners. However, the proportion of speech produced by each dyad member did not appear to be a function of whether the child was the older or the younger member of the dyad (see Figure 9). In two dyads the younger child contributed

Figure 9. The number of utterances produced by the younger normal target children and the older normal children in each of the four dyads.



the majority of utterances; in two other dyads, the older child did. This same variable pattern was observed with action directives (Figure 10), responses (Figure 11), and judgments (Figure 12).

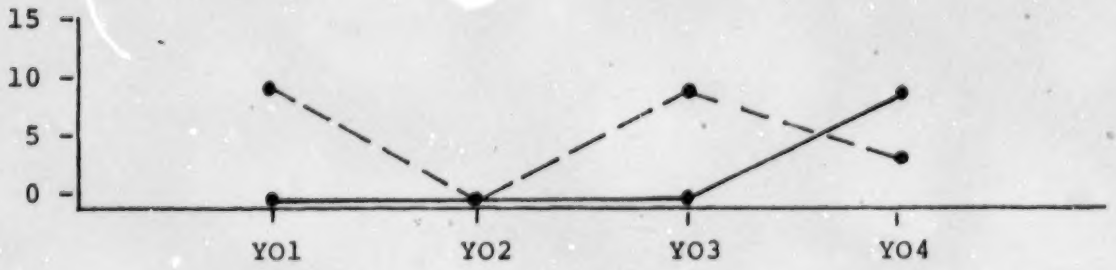
Figure 10. The number of action directives produced by the target younger and the older normal children in each of the four dyads.



_ _ _ _ Target younger children

_____ Older normal children

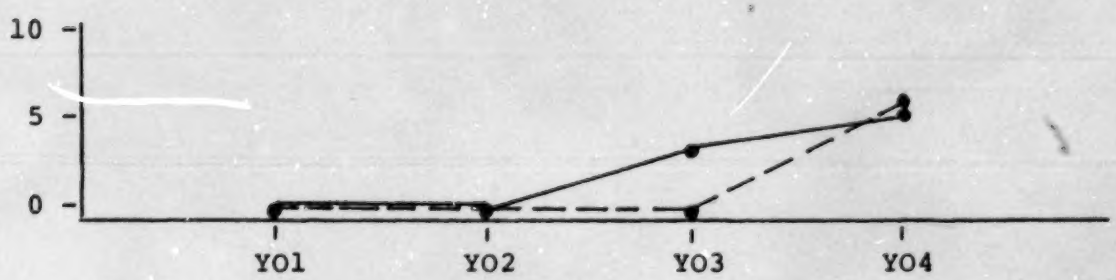
Figure 11. The number of responses produced by the target younger and the older normal children in each of the four dyads.



- - - - Target younger children

_____ Older normal children

Figure 12. Number of judgments produced by the target younger and the older normal children in each of the four dyads.



- - - - Target younger children

_____ Older normal children

As in the NR and S dyads, judgments again showed a tendency toward symmetry. In this group, the tendency was for judgments to be produced by neither member of the dyad. In dyad YO4, judgments were produced with relatively equal frequency by each member.

The results discussed above occurred regardless of the sex of the dyad members. There were too few dyads in each group to meaningfully consider possible age or sex effects.

DISCUSSION

The general findings of the present study did not reveal performance differences on a problem solving task as a function of dyad composition--same-age normals (S), younger and older normals (YO), or normals with older but equivalent mental age retarded (NR). While performance did not differ in terms of efficiency in completing the task, the nature of the communicative interactions which led to task completion varied markedly in the three dyad types. The normal target children (ranging from 7 to 9 years of age) did indeed modify their communication behaviors with different partners.

With older retarded partners, the normal target children dominated the verbal interchange, although both members in these dyads were of similar mental age. With normally developing agemates, the normal targets equally shared conversational obligations. Interactions with older normal children were marked by a great deal of inconsistency. In some dyads the younger child dominated slightly, while in other dyads the older child clearly dominated. These findings are explored further and possible implications for development are considered in the following discussion.

The results occurring in the same-age and mixed-age dyads in this study can be related to similar work done by Lougee and his colleagues (Lougee, Grueneich, & Hartup, in press). Although these researchers studied younger dyads (3 and 5 years old) and used somewhat different measures, some of the general findings of both studies are comparable.

In both studies, same-age dyads were characterized by "well-matched" communication between dyad members. That is, each member tended to modulate their behavior to correspond with the level of verbal behavior of their partner. This convergence tendency created an interactional symmetry. Mixed-age dyads showed an inconsistency in accommodation. There was no general tendency for older dyad members to produce more speech than the younger members.

The dyads with normal and retarded members displayed neither the symmetry observed in the same-age dyads nor the inconsistency observed in the mixed-age dyads. Instead, these dyads were characterized by a nonsymmetrical communicative style--interactions were dominated by the normal partner. This finding supported the original hypothesis that the normal children would alter their communication behaviors as a result of the deficiencies in logical problem solving on the part of their retarded partners. Since the retarded had difficulty attacking the task, the normals assumed control in order to get the task completed. Perhaps in a free play situation without the task, the normals may have accommodated more to the low level of verbal output by the retarded.

Implications for development

This study noted a tendency for same-age partners to accomodate their communication behaviors to each other. This convergence created a symmetrical communicative exchange. This phenomenon, frequently noted in adult dyadic communication studies, is referred to as speech accommodation in this literature (Giles, 1973, 1977; Giles & Powesland, 1975; Simard, Taylor, & Giles, 1976).

In this theory, similarity between conversational partners is an important ingredient for accomodation to occur. Furthermore, the similarity of partners enhances liking, following from tenets of similarity-attraction theory (Giles, 1977). Thus, if we can generalize from studies with adults, we might speculate that the convergence evidenced in the same-age dyads in the present study provided a positive social experience for the dyad members. In turn, following a reinforcement paradigm, the positive nature of the interaction should enhance the further development of social skills. Indeed, Lougee and his colleagues suggest that equalitarian child-child relations (similarity of age, sex, ethnicity, ability level, and socio-cultural backgrounds) contribute uniquely to both immediate social communication and long term development (Lougee, Goldman, & Hartup, 1977).

While equalitarian dyads may provide a climate conductive to social communication, it is also likely that mixed-age dyads may make yet other contributions to development (Konner, 1975). Proficient communicators are able to adapt their communication to partners who vary greatly from themselves. Indeed, evidence exists that convergence tendencies are not limited to equalitarian dyads. Studies of adult-child verbal interactions indicate an accommodation on the part of the adult to the child's level of speech output. Bloom, Rocissano, & Hood (1976) observed these patterns in adult-child speech as the children progressed from Brown's (1973) Stage 1 (MLU 2.0) through Stage V (MLU 3.5-4.0).

Although convergence tendencies had clearly not stabilized in the mixed-age dyads in the present study, these social experi-

ences should be encouraged since they provide a situation where the further development of social communication skills could be fostered.

While differing from the adaptation characteristic of convergence, the dominance exhibited by the normal children in the NR dyads reflects another type of adaptation. In light of the problem solving goal to be achieved, the normal children did what they had to do to accomplish this end. It is interesting to note that while all the normal children took command, their styles in doing so varied markedly. Three of the four normals interacting with retarded partners clearly either knew from the start or gradually figured out how to match the blocks. What they did with this knowledge differed in all three cases, however.

One child spontaneously assumed a teacher role and shared the solution with his retarded partner. The following two excerpts from the transcription of this dyad are illustrative.

Nonverbal context:	Normal target child utterances:
1. Joseph (J) picks up block with needle on it from his pile and looks through Michael's (M) pile until he finds the block with a picture of thread on it.	
J showing these two blocks to M.	Needle and thread.
J puts his block on the balance scale pan and looks at M.	
J pointing to M's block.	Put yours in.
2. J pointing to his blocks and then to M's corresponding blocks as the labels each pair.	We're matching and the shoe and the sock and the can and the mop. . .

In the other two dyads where the normal child knew the solution, two different non-teaching styles were observed. In one dyad, the normal child assumed a directive approach. He simply pointed to the block the retarded child should put in for each turn. The reason why the blocks matched was never verbalized or demonstrated. In the other dyad, a passive style emerged on the part of the normal child. After the normal child figured out the way the blocks matched, she allowed the retarded child to first place a block on the balance scale pan and then placed in the corresponding block from her pile.

The benefit to the retarded child, in terms of potentially learning to solve the task, occurred in only one dyad. However, the normal children were not instructed to be teachers in this task. The one child who did attempt to teach the task did so spontaneously. It would be interesting to attempt to delineate any differentiating characteristics of these "natural" teachers in future research.

While the task involved may have precipitated the normal child's dominance in these dyads, this pattern only serves to emphasize the retarded children's deficiencies in both problem solving and social communicative skills. Indeed, other research supports the notion that although retarded children may learn the same linguistic structures as normally developing children at a similar mental age, their ability to put that knowledge to use as either a social-interactive or problem solving tool may be deficient (Morris, 1972; Woods, 1974). The dominance by the normals in the communicative interaction causes concern about the quality

of social interaction a retarded child experiences with normally developing children of a similar mental age. Perhaps interactions with normal children of a lower mental age than the retarded children would balance their problem solving and communication skills enough to foster more symmetrical communication, and would allow the benefits to social development of equalitarian dyads.

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